

CLAIMS

I claim:

- 5 ~~1.~~ A method for operating a selected router of a network, the router performing per-session load balancing, the method comprising:

 configuring a load balancing algorithm to reduce correlation of distribution of sessions among the active paths at the selected router relative to distributions of sessions of load balancing algorithms at other routers of said network; and

- 10 assigning packets arriving at said selected router to a path according to said load balancing algorithm.

2. A method as in claim 1 wherein the load balancing algorithm has multiple parameters and wherein configuring the load balancing algorithm includes steps of:

- 15 selecting a random value; and
 setting one of the multiple parameters of the load balancing algorithm to be the random value.

3. A method as in claim 1 further including:

- 20 monitoring the load balancing of packets for unacceptable performance;
 if there is unacceptable performance, reconfiguring the load balancing algorithm by setting the one of the multiple parameters to a different random value.

4. A method as in claim 1 further including:

- 25 monitoring the load balancing of packets for unacceptable performance;

if there is unacceptable performance, reconfiguring the load balancing algorithm by setting the one of the multiple parameters to a unique value.

5. A method of load balancing a packet at a router using per-session load balancing comprising:

receiving a packet at a router having an associated identifier;

obtaining a source address and a destination address of the packet;

selecting an output path according to a load balancing algorithm that uses the associated identifier, the source address, and the destination address as inputs;

- 10 sending the packet to an output interface associated with the selected output path.

6. A method as in claim 5 wherein a look-up table that is configured using the associated identifier is used in the step of selecting.

- 15 7. A method as in claim 6 wherein the look-up table is configured at a set-up time of the router.

8. A method as in claim 6 wherein the look-up table is a randomized hash look-up table.

- 20 9. A method as in claim 8 wherein the randomized hash lookup table is configured by performing steps of:

creating an initial hash table having a plurality of rows;

seeding a random number generator with the associated identifier;

obtaining a next random number and another next random number from the random number generator;

swapping a row associated with the next random number and a row associated with the another next random number;

5 repeating the steps of obtaining and swapping a preset number of times.

10. A router storing an identifier assigned to said router, wherein the identifier is used in determining per-session load balancing of incoming packets.

10 11. A router as in claim 10 wherein the identifier is derived from a second identifier.

12. A router as in claim 11 wherein the identifier is derived by seeding a random number generator with the second identifier.

15 13. A router as in claim 10 wherein the identifier is derived by seeding a pseudo-random number generator with the second identifier.

14. A router as in claim 10 wherein the second identifier is an IP address of the router.

20 15. A router as in claim 10 wherein the second identifier is a serial number of the router.

16. A router as in claim 10 wherein the second identifier is set by a manufacturer of the router.

17. A router as in claim 10 wherein the identifier is a random number.

18. A router as in claim 10 wherein the identifier is assigned at a time of placing the router in service.

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19. A router as in claim 10 wherein the identifier is unique.

20. A method as in claim 10 wherein the load balancing algorithm is implemented using a look-up table that is configured using the identifier.

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21. A method for assigning an identifier to a router comprising:

obtaining an IP address of the router;

seeding a random number generator with the IP address; and

assigning an output of the random number generator as an identifier of the

15 router.

22. A method for configuring a portion of a packet switched network to reduce load balancing polarization comprising:

setting at least one of a plurality of routers of a same model included in a portion of a

20 network to have a different load balancing algorithm from a second one of the plurality of routers.

23. A method for configuring a portion of a packet switched network to reduce load balancing polarization comprising:

setting at least one of a plurality of routers of a same manufacturer included in a portion of a network to have a different load balancing algorithm from a second one of the plurality of routers.

- 5 24. A system for load balancing a packet at a router comprising:
- means for receiving a packet at a router having an identifier;
 - means for obtaining a source address and a destination address of the packet;
 - means for determining an output path according to a load balancing algorithm that depends on the identifier, the source address, and the destination address;
 - 10 means for routing the packet to the output path.

25. A system for assigning an identifier to a router comprising:
- means for obtaining an IP address of the router;
 - means for seeding a random number generator with the IP address; and
 - 15 means for assigning an output of the random number generator as an identifier of the router.

26. A system for operating a selected router of a network by per-session load balancing, the method comprising:

- 20 means for configuring a load balancing algorithm to de-correlate distribution of traffic among output paths relative to distribution of traffic by load balancing algorithms at other routers of said network; and
- means for load balancing packets arriving at said selected router according to said load balancing algorithm.

27. A computer program product for operating a selected router of a network, the router performing per-session routing, comprising:

computer code that configures a load balancing algorithm to reduce correlation
5 of distribution of sessions among the active paths at the selected router relative to
distributions of sessions of load balancing algorithms at other routers of said network;
and

computer code that routes packets arriving at said selected router according to said
load balancing algorithm; and

10 a computer readable medium that stores the computer code.

28. The computer program product of claim 27, wherein the computer readable medium is
a CD-ROM, floppy disk, tape, flash memory, system memory, hard drive, or data signal
15 embodied in a carrier wave.

29. A computer program product for routing a packet at a router using per-session routing
comprising:

computer code that receives a packet at a router having an associated identifier;
20 computer code that obtains a source address and a destination address of the packet;
computer code that selects an output path according to a load balancing algorithm that
uses the associated identifier, the source address, and the destination address as inputs;
computer code that load balances the packet to the selected output path; and
a computer readable medium that stores the computer code.

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30. The computer program product of claim 29, wherein the computer readable medium is a CD-ROM, floppy disk, tape, flash memory, system memory, hard drive, or data signal embodied in a carrier wave.

- 5 31. A computer program product for assigning an identifier to a router comprising:
- computer code that obtains an IP address of the router;
 - computer code that seeds a random number generator with the IP address;
 - computer code that assigns an output of the random number generator as an identifier of the router; and
- 10 a computer readable medium that stores the computer code.

32. The computer program product of claim 31, wherein the computer readable medium is a CD-ROM, floppy disk, tape, flash memory, system memory, hard drive, or data signal embodied in a carrier wave.

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